The Future Joint Operating Environment (JOE)

USJFCOM J9 - Deep Futures

Cleared For Public Release
Administrative/Operational Use, 16 Nov 07.
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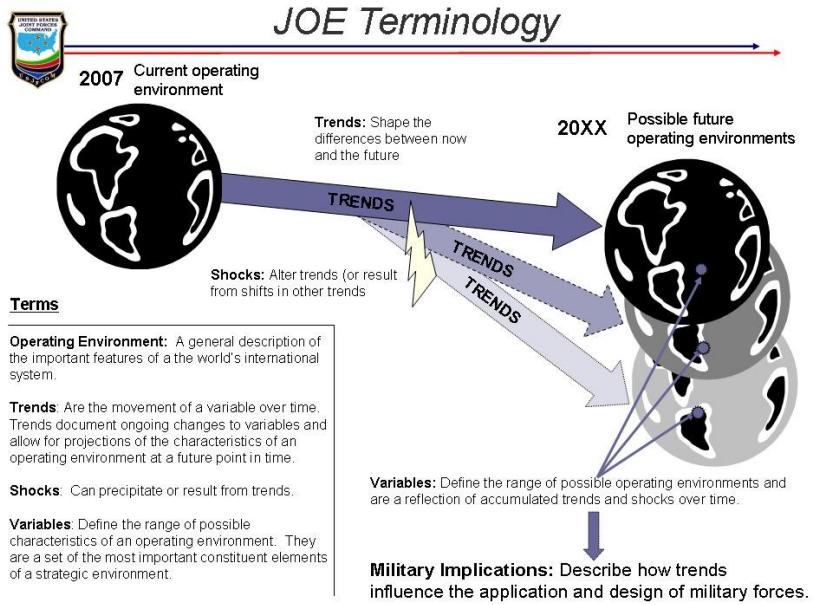
Futures Group – Deep Futures

Deep Futures provides a coherent look into the trends shaping the future operating environment and identifies the military impl

Objectives:

- Identify the emerging threats and opportunities of

  the future security environment
- Facilitate understanding of these emerging threats and opportunities across the JCD&E enterprise


JOE Terminology
2007 Current operating environment
Trends: Shape the differences between now and the future
20XX Possible future operating environments
TRENDS
TRENDS
TRENDS
Shocks: Alter trends (or result from shifts in other trends
Terms
Operating Environment: A general description of the important features of a the world's international system.
Trends: Are the movement of a variable over time. Trends document ongoing changes to variables and allow for projections of the characteristics of an operating environment at a future point in time.
Shocks: Can precipitate or result from trends.
Variables: Define the range of possible characteristics of an operating environment. They are a set of the most important constituent elements of a strategic environment.
Variables: Define the range of possible operating environments and are a reflection of accumulated trends and shocks over time.
Military Implications: Describe how trends influence the application and design of military forces.

Products:

- The Joint Operating Environment (JOE) document
- Trend
- Confe study reports

Activities:

- Research / Writing
- Conferences and Workshops
- Outreach

Partners:

- TRADOC, JS J5, USAF A8X, USMC SVG and CETO, USCG Office of Strategic Analysis,…and growing

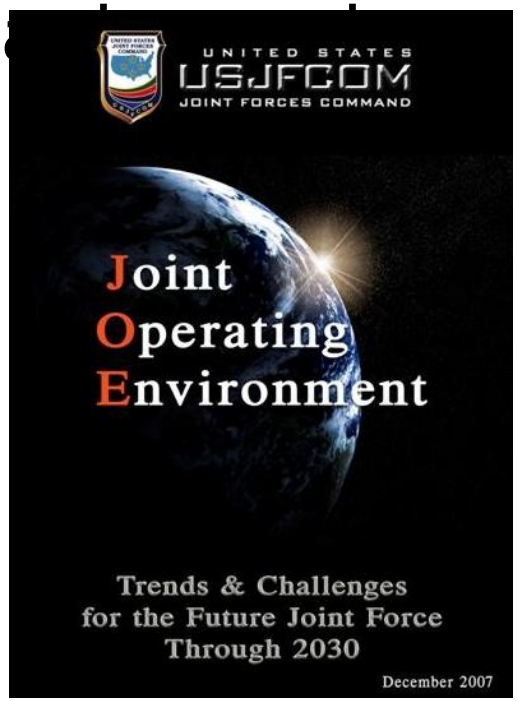
Deep Futures: Futures Enterprise

Partners

- National Intelligence Council (NIC) / Director of National Intelligence (DNI)
- DoS and Joint Staff J5 (Project Horizon)
- OSD Plans and Policy
- Johns Hopkins Applied Physics Lab
- USMC Strategic Vision Group (SVG) and Center for Emerging Threats and Opportunities (CETO)
- Air Force Research Lab (AFRL)
- Development, Concepts, and Doctrine Center (DCDC) (UK)
- US Army Training and Doctrine Command (TRADOC)
- Naval War College (NWC)
- USCG Office of Strategic Analysis
- USAF A8X
- Chief of Naval Operations Strategic Studies Group (CNO SSG)
- National Research Labs (DARPA, ORNL, Sandia)
- Center for Strategic and Budgetary Assessments (CSBA)
- Eurasia Group
- USJFCOM Transformation Advisory Group (TAG)
- US European Command (EUCOM)
- Bundeswehr Transformation Center (GE)

The Joint Operating Environment

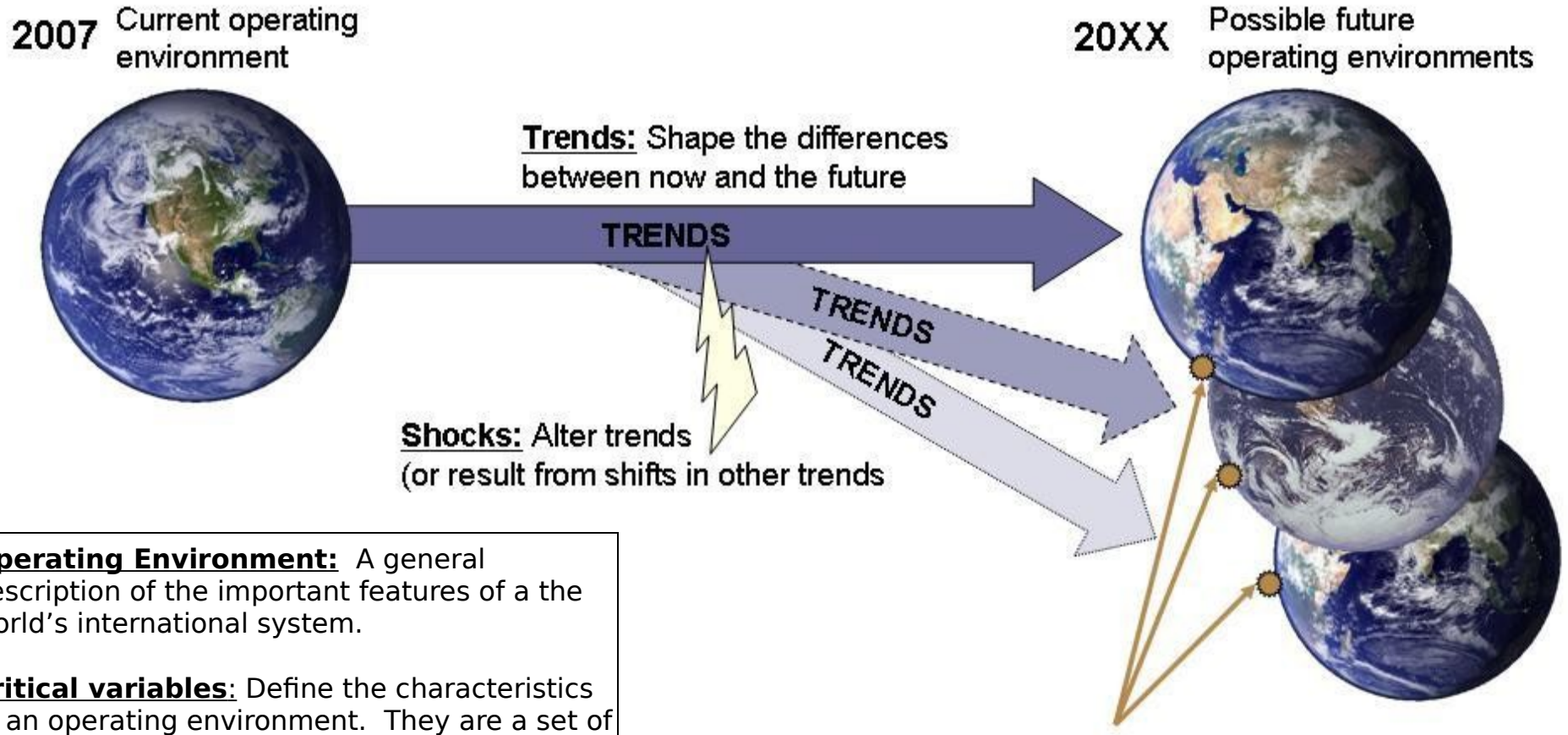
- Document describes present and possible future trends, conditions, variables, circumstances and influences that will affect how a Commander will org employ his forces.
  - Not intended to describe specific areas of operation, nor adversaries, but general conditions that shape the environment of conflict.



The JOE Document

- Chapter 1: Introduction
- Chapter 2: Trends in the Joint Operating Environment
  - Human Geography
  - Governance and Legitimacy
  - Resources and Economics
  - Science, Technology, and Engineering
- Chapter 3: Challenges Facing the Future Joint Force
  - Enduring Challenges
  - Emerging Challenges
  - National Security Shocks
- Chapter 4: Implications for the Joint Force
  - Terrain
  - Base
  - Knowledge
  - Force Application
  - Command
- Chapter 5: Conclusion

JOE Terminology



Operating Environment: A general description of the important features of a the world's international system.

Critical variables: Define the characteristics of an operating environment. They are a set of the most important constituent elements of a strategic environment.

Trends: Are the movement of a variable over time. Trends document ongoing changes to variables and allow for projections of the characteristics of an operating environment at a future point in time.

Shocks: Can precipitate or result from trends.

Critical Variables: Define operating environments. Differences in variables are a reflection of accumulated trends and shocks over time.

Military Implications: Describe how trends influence the application and design of military forces.

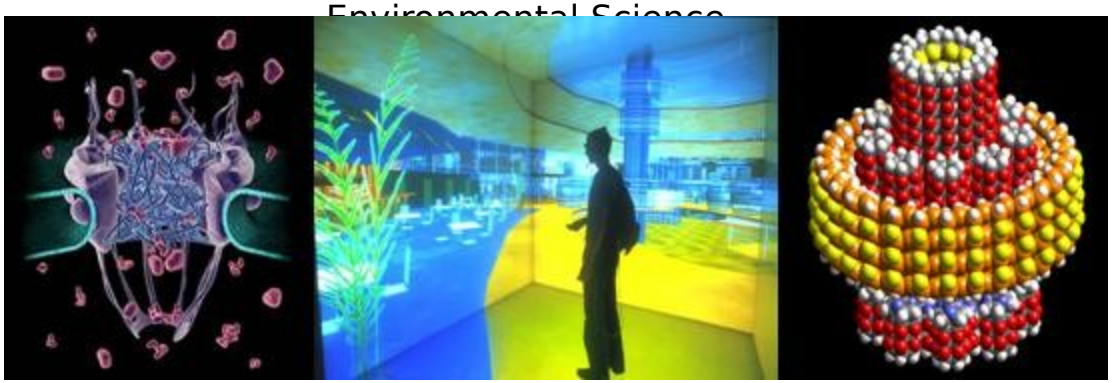
Chapter 2: Trends

- **Human Geography**
  - Population Growth
  - Age Distribution
  - Gender Imbalance
  - Climate Change
  - Crime
  - Culture
  - Education
  - Ethnicity
  - Health
  - Urbanization
  - Migration

- **Governance and Legitimacy**
  - The Powerful
  - The Weak
  - Legitimacy
  - Failed or Failing States
  - Transnationalism
  - Regionalism
  - Terrorism
  - Alliances and Coalitions

- **Resources and Economics**
  - Climatic Disruption
  - Resource Competition
  - Distribution of Wealth
  - Global Trade Networks
  - Information-Age Economics
  - Economic Regionalism
  - Global Labor Markets

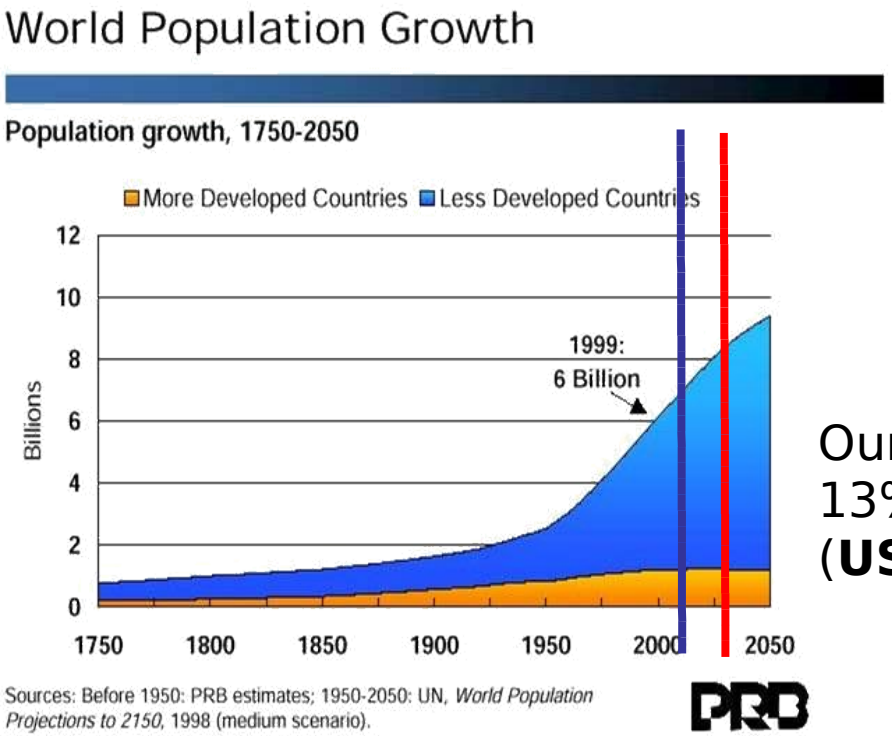
- **Science, Technology, and Engineering**
  - Biological Systems
  - Machines and Computers
  - Information, Knowledge, Communications
  - Energy
  - Weapons of Mass Effect
  - Environmental Science

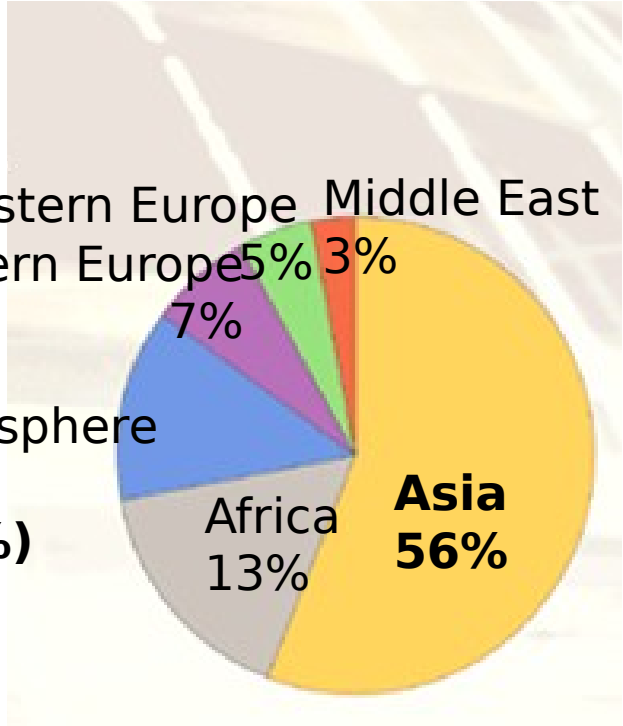


Human Geography

- Wealth Distribution Gap Widening
  - Within and across states
- Public Health is improving, but…
  - AIDS epidemic continues
  - Pandemic Influenza threat
- Migration
  - Muslims to Europe
  - Europeans to U.S?
  - Brain drain from developing countries
- Crime
  - Human smuggling overtaking drug smuggling as transnational crime
- Culture, ethnicity
  - Religious ideology and identity politics increasing
  - Militant Islam
- Training, education
  - Science, tech, engineering degrees going to foreign nationals

Population and Demographics





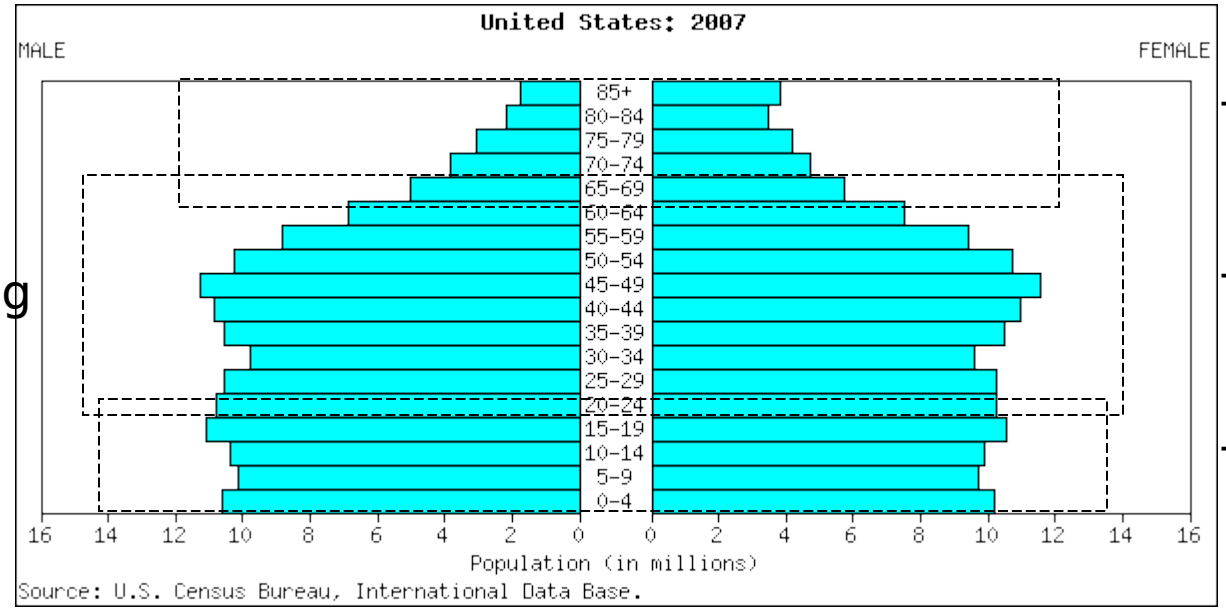
- 2 billion more people by 2025, 56% of global population will be in Asia
- 66% will live in urban areas along coastlines
- The populations of developed countries are aging – rapidly
- Age divide between developed and developing nations will lead to large migration of work force from developing to developed

Population Pyramids – U.S.

The retired Cohort

The wage-earning Cohort

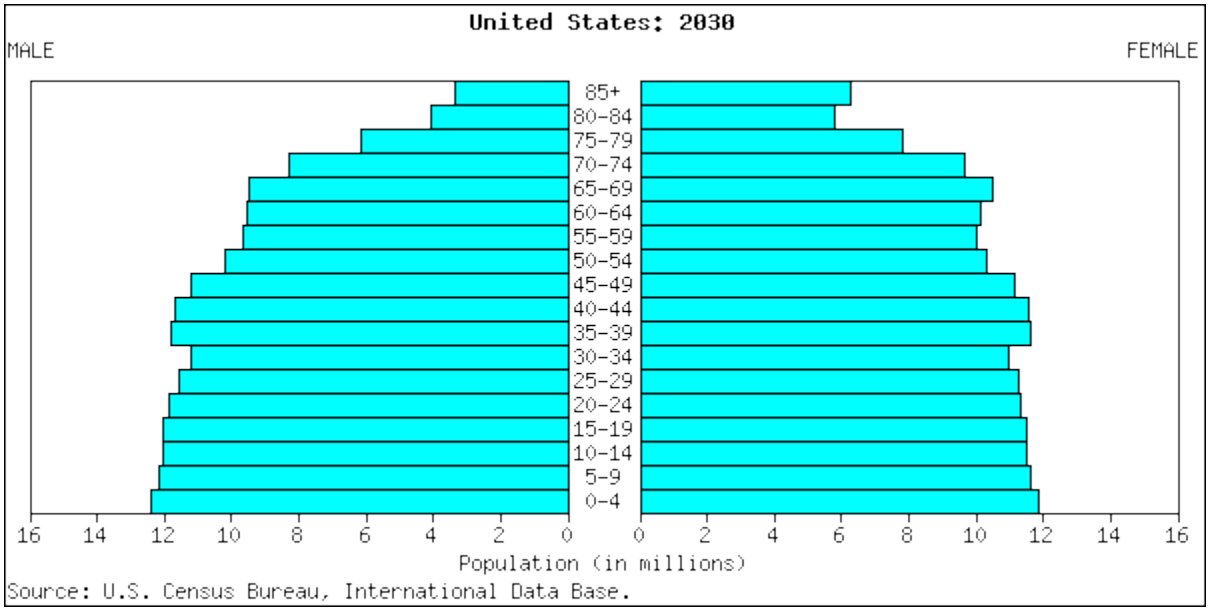
The schooling cohort



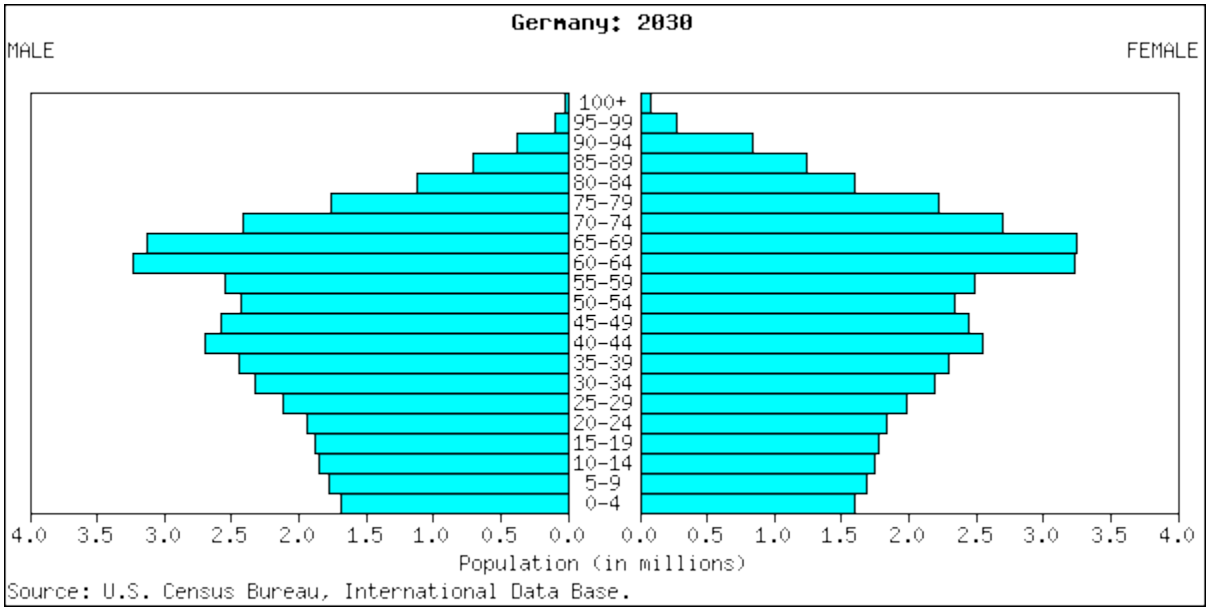
The Past

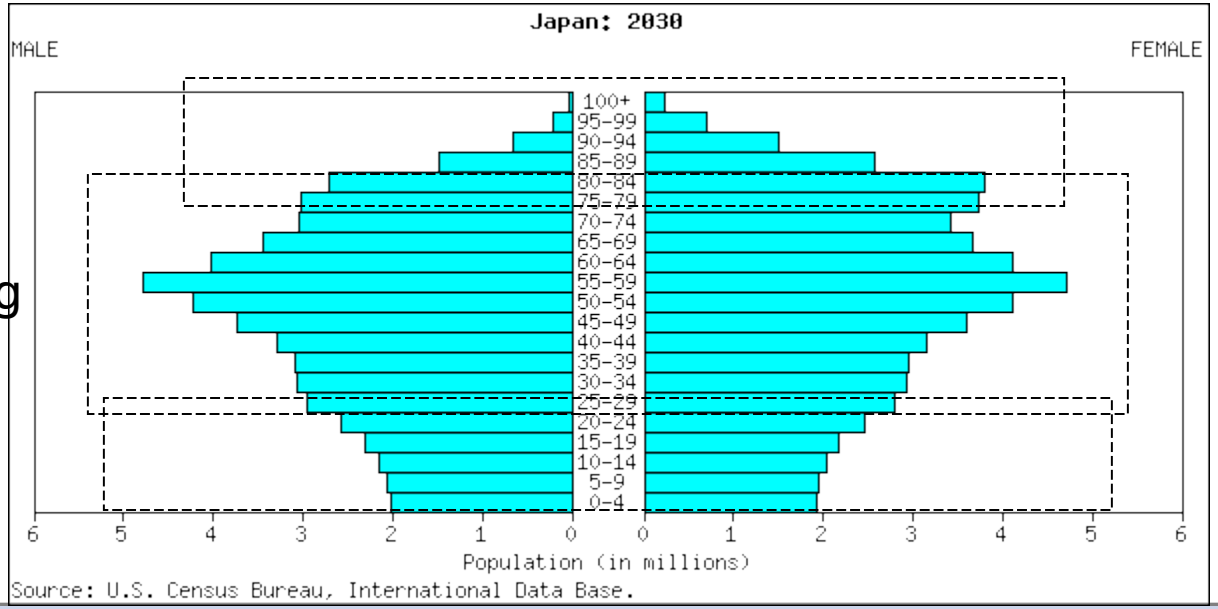
The Present

The Future



Population Pyramids – Developed Nations





The retired Cohort

The wage-earning Cohort

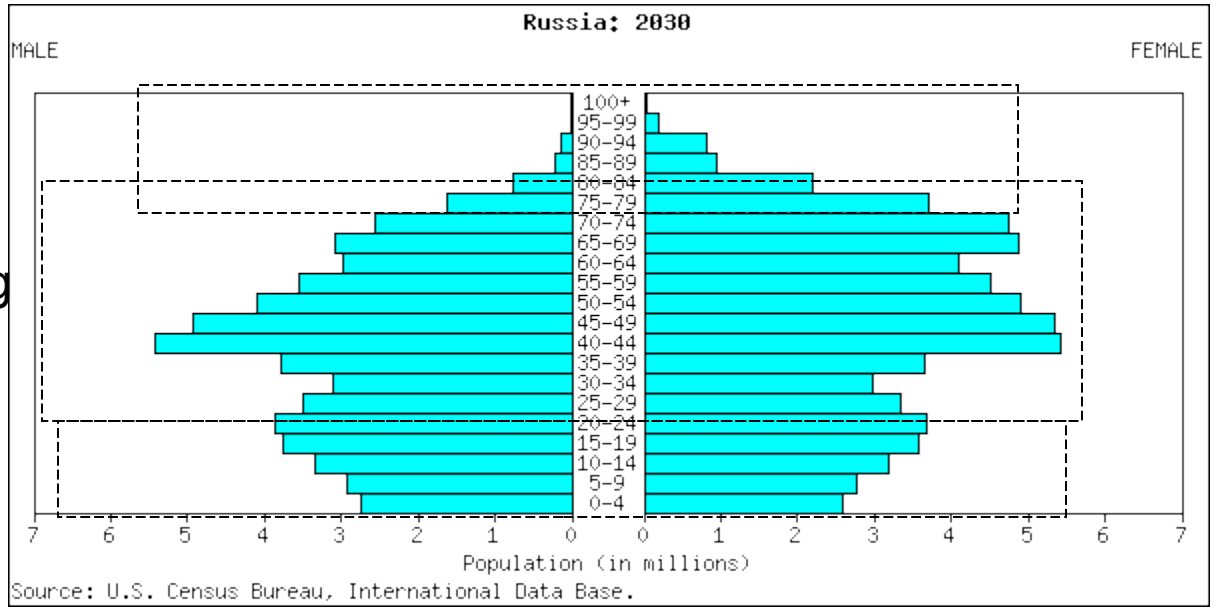
The schooling cohort

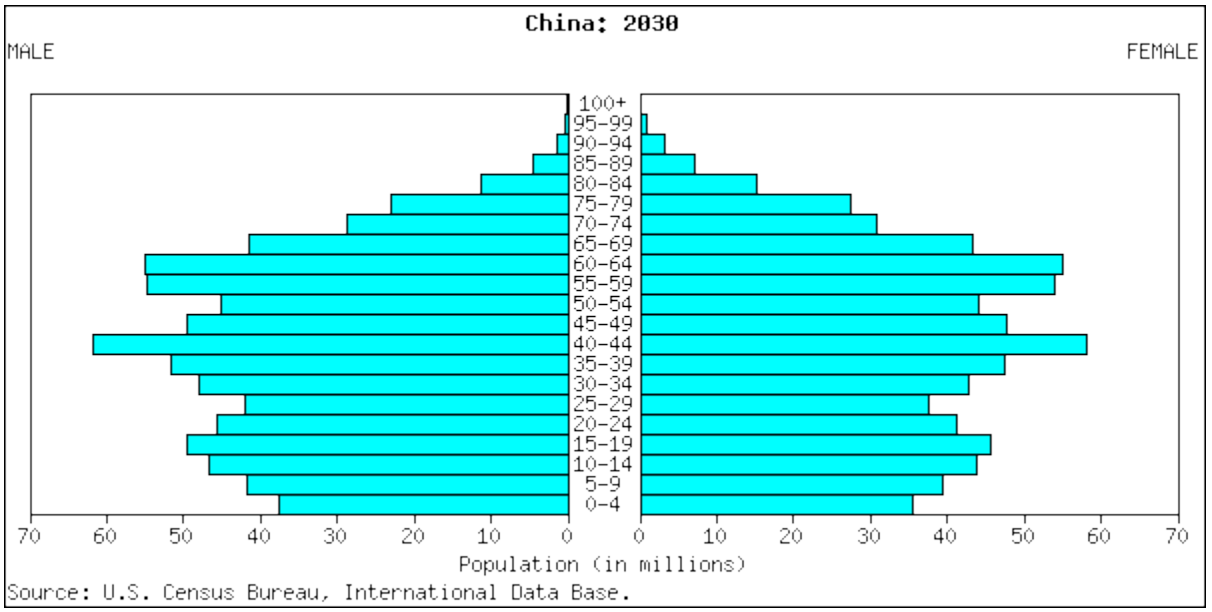
Population Pyramids – Russia & China

The retired Cohort

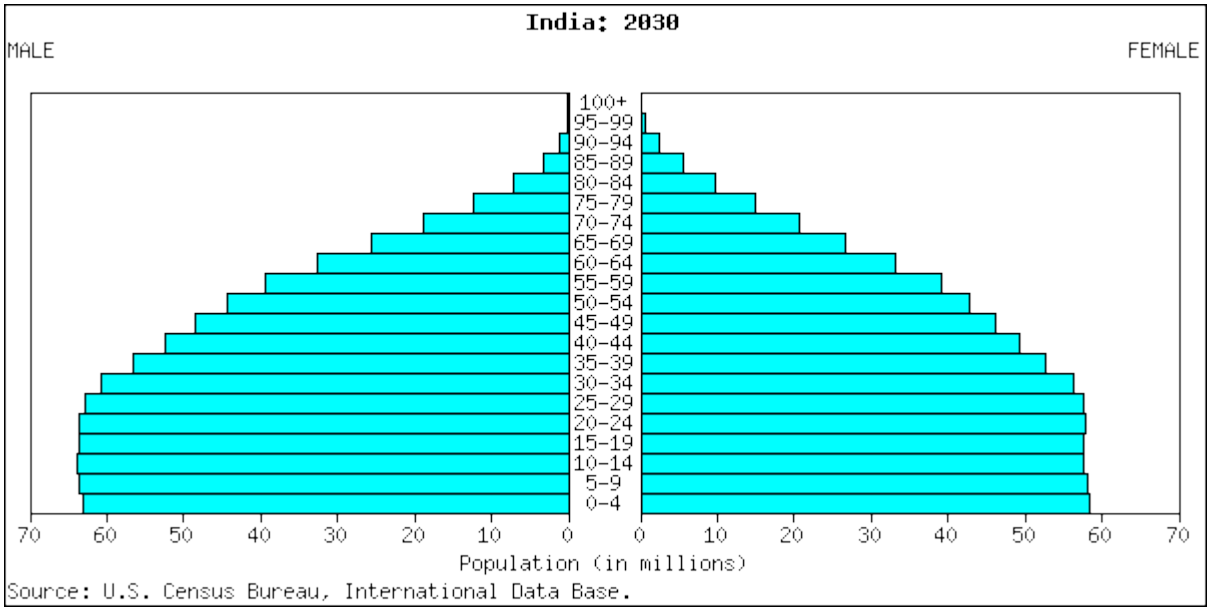
The wage-earning Cohort

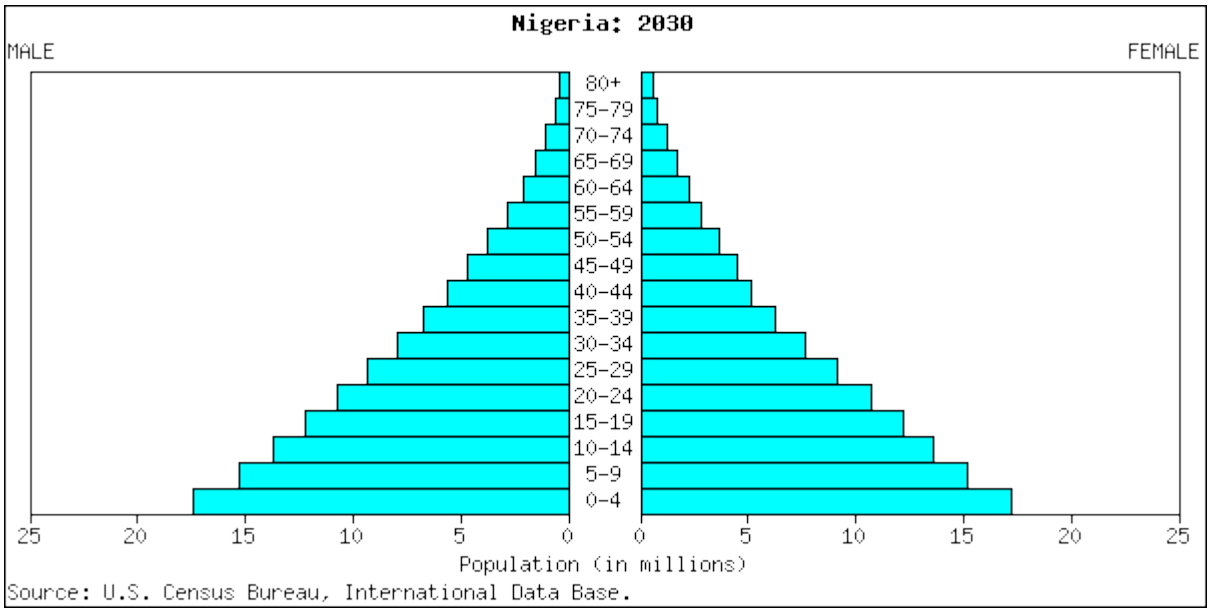
The schooling cohort





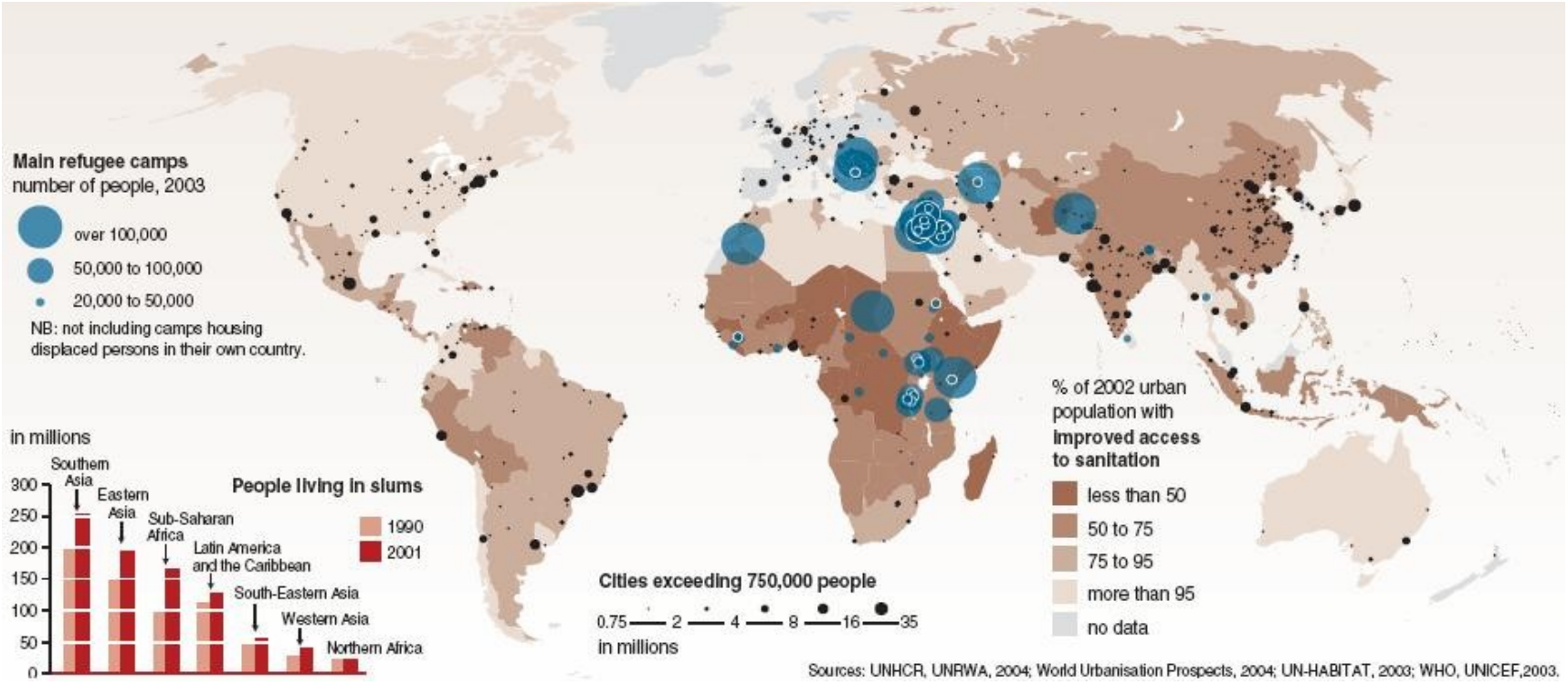
Population Pyramids – India and Nigeria



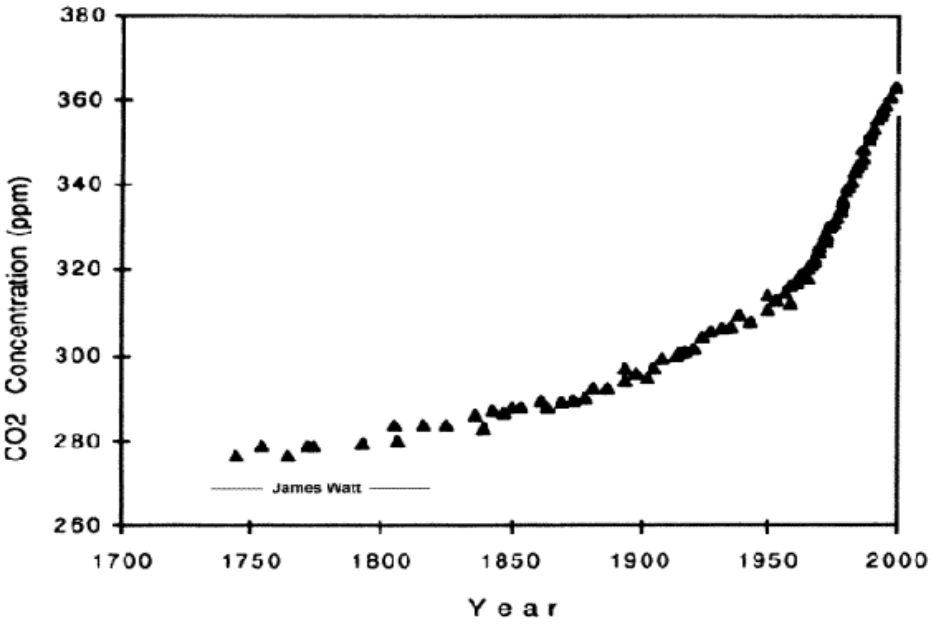


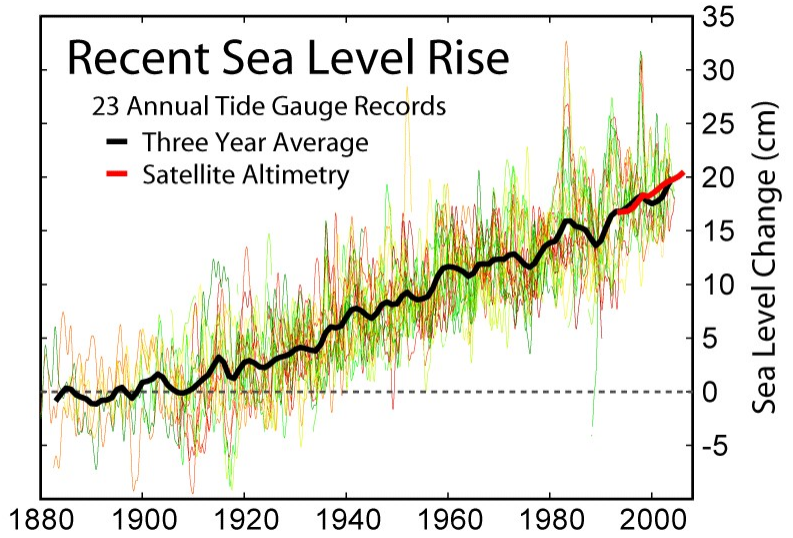
Urbanization

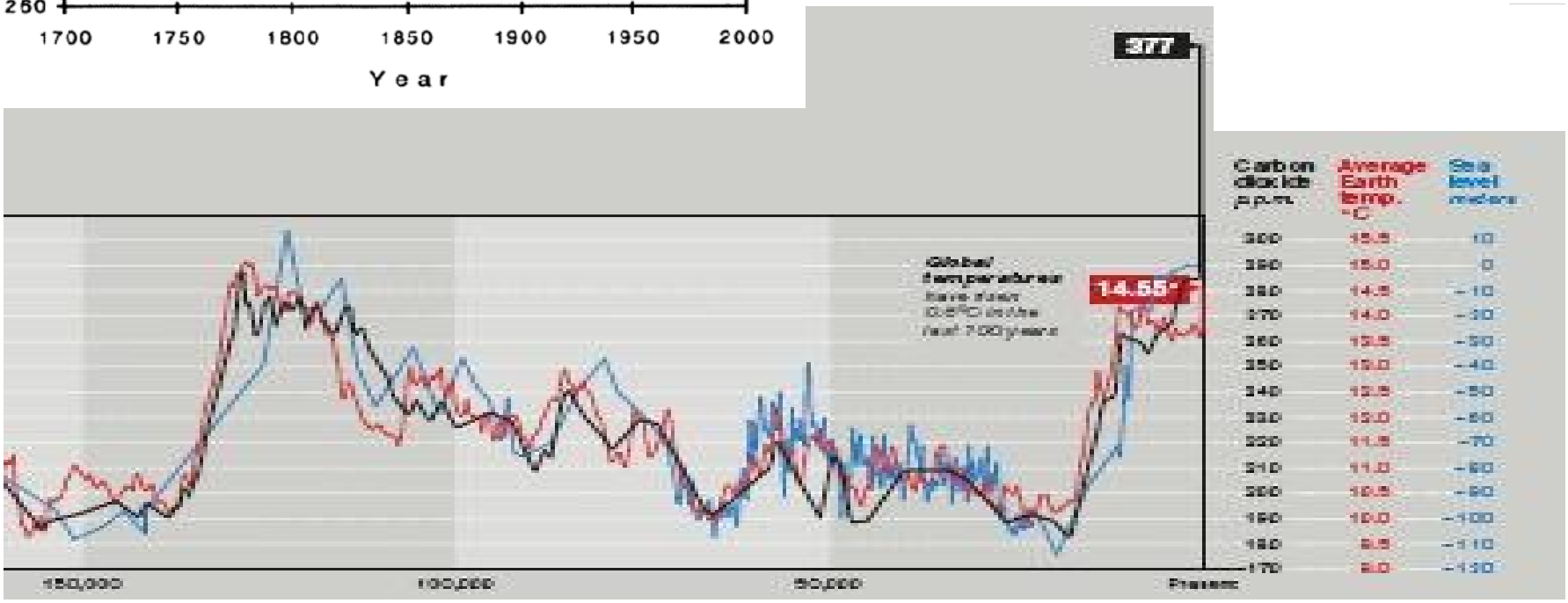
- Big cities getting bigger—and poorer
- 66% of world in cities by 2030
- 2007: 3.2 billion people in cities - a number larger than the entire global population of 1967



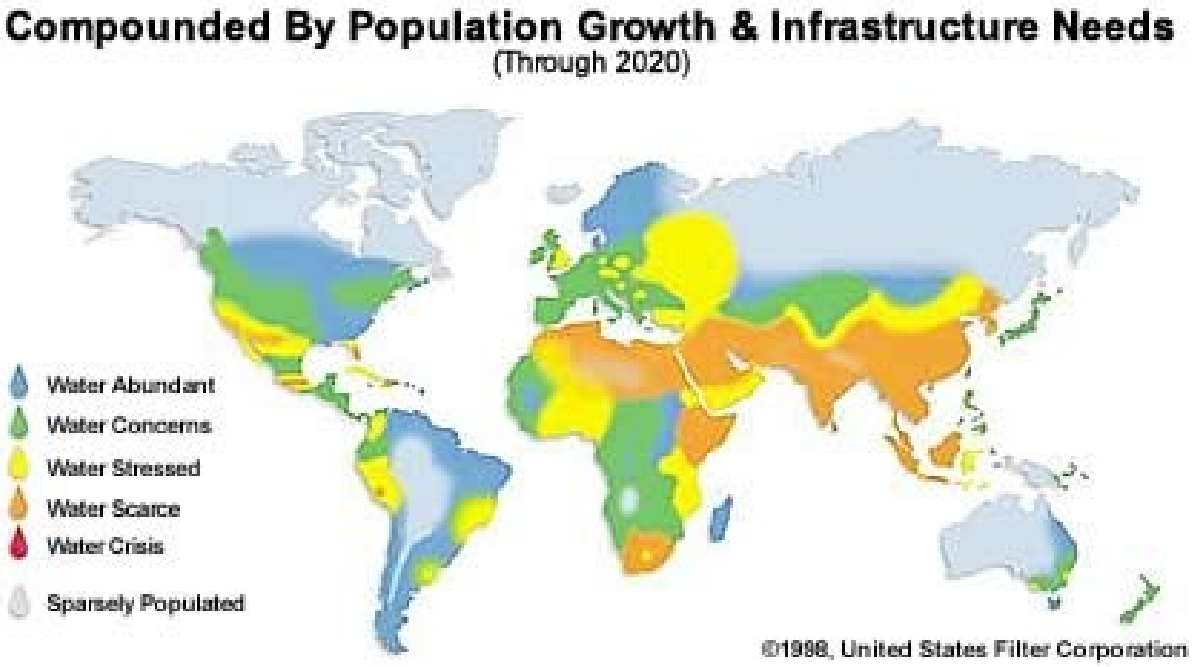
Climate Change



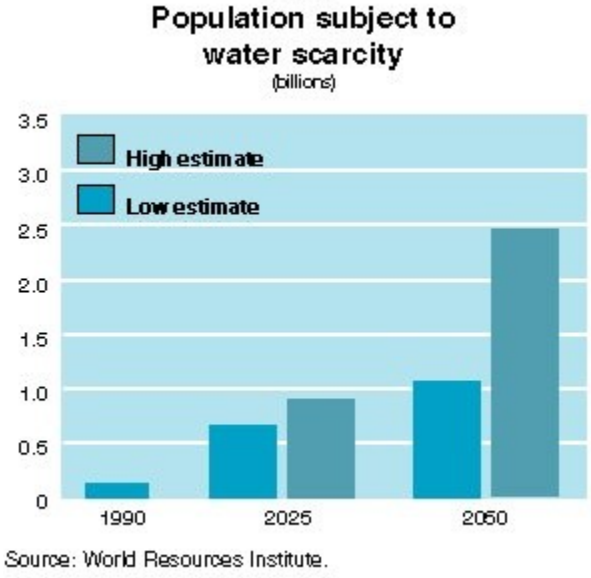




Resources and Economics: Scarcity and Stress

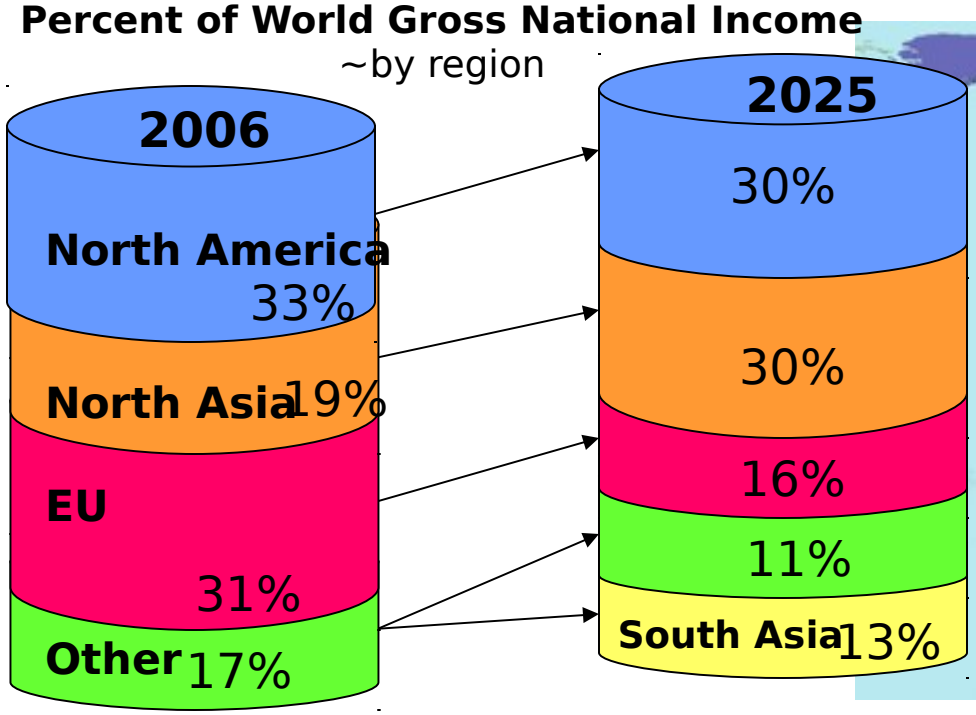


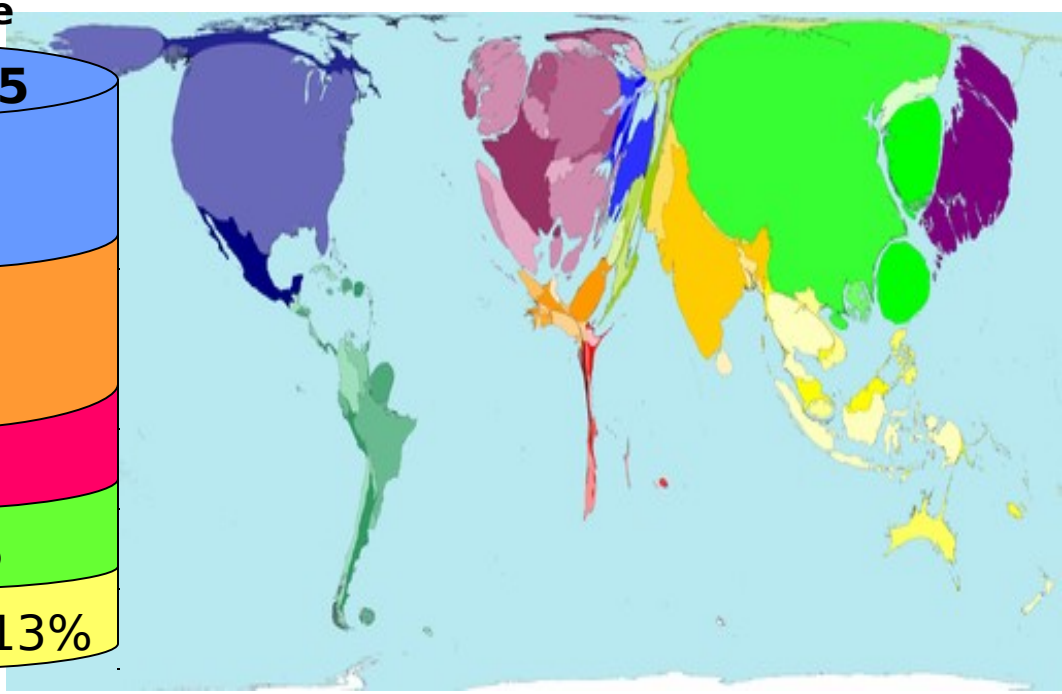
- Desertification and shifting growth bands stress food production
- Substantial populations face water stress



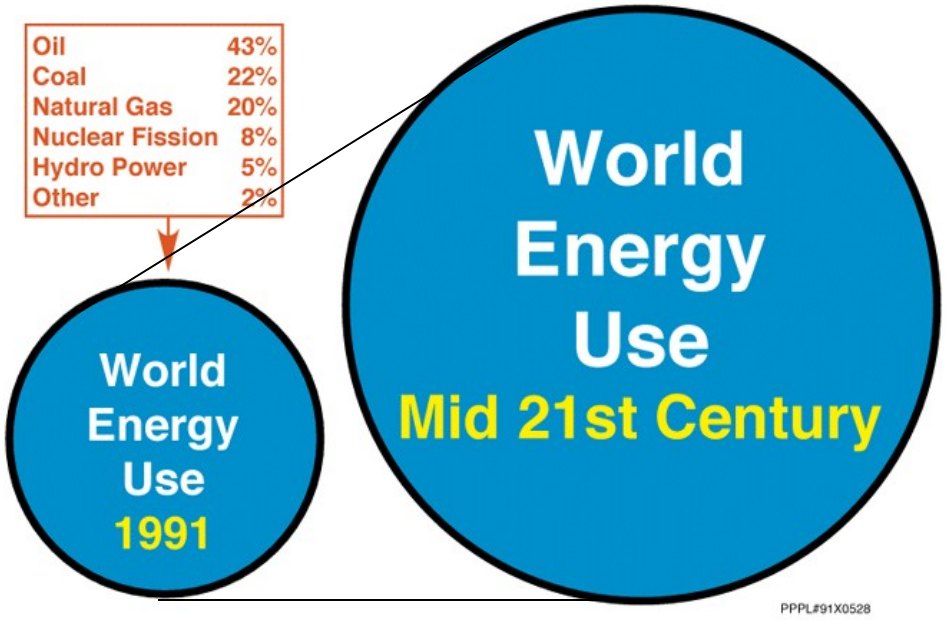
Economic Globalization

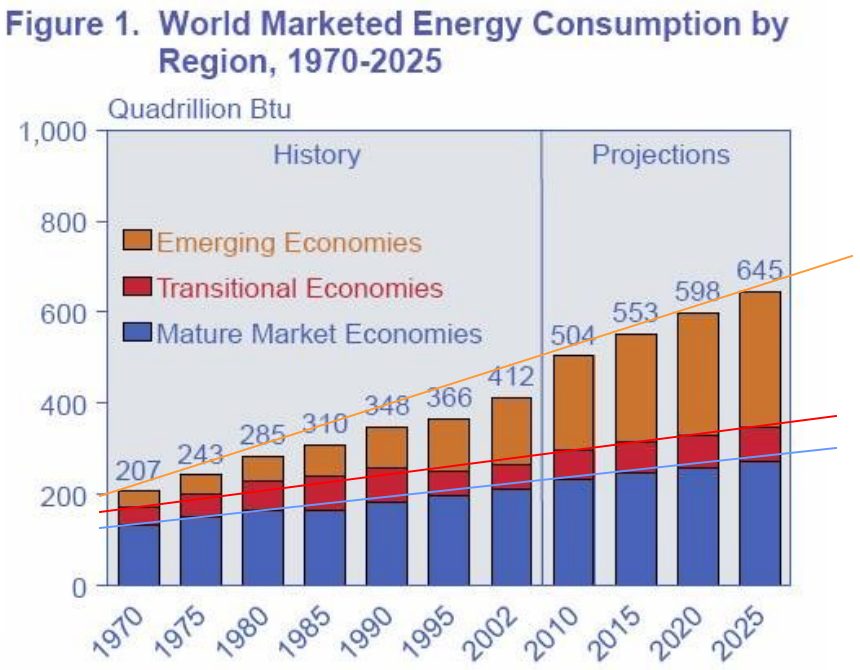
- Globalization will continue to be the overarching trend that shapes others. Reversal would have dramatic consequences
  - Increasing connectivity and travel will level the playing field
  - Transformers win, those that lag may encounter instability
- The rise of new Asian Powers will re-orient the world
  - China as the 2nd largest economy – may pass EU in 2015, US by 2040
  - India as the 3rd largest economy – may pass EU by 2025





Global Energy Stress

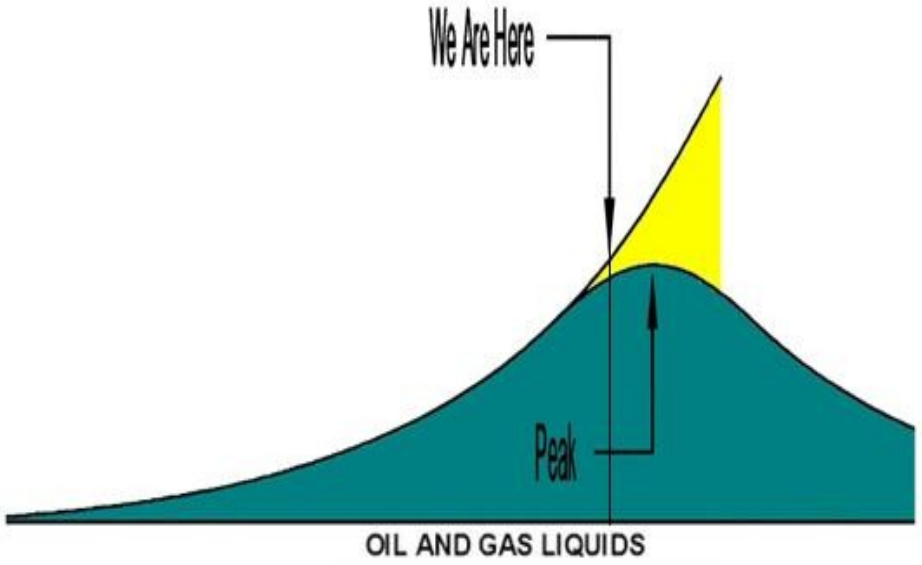


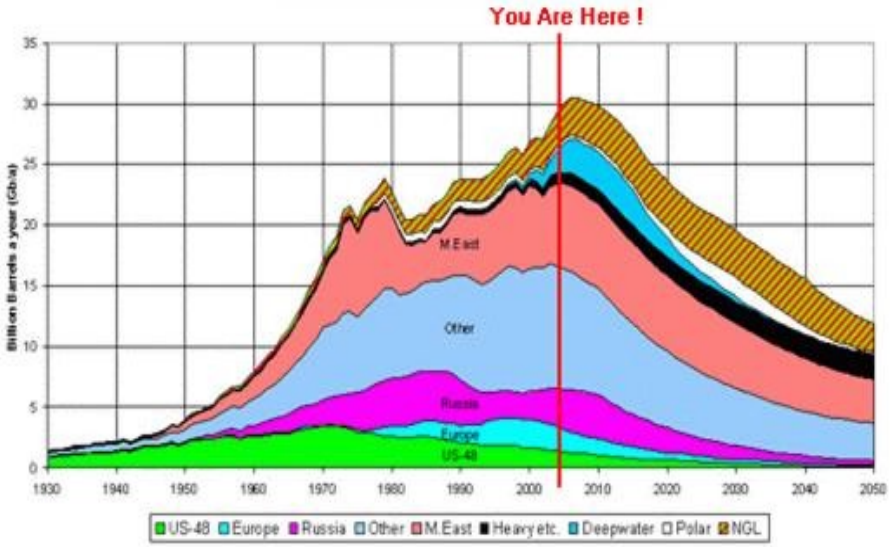


- Vastly increased demand as developing nations transition to first world standard of living
- Energy demand will continue to shape international politics

Global Energy Stress

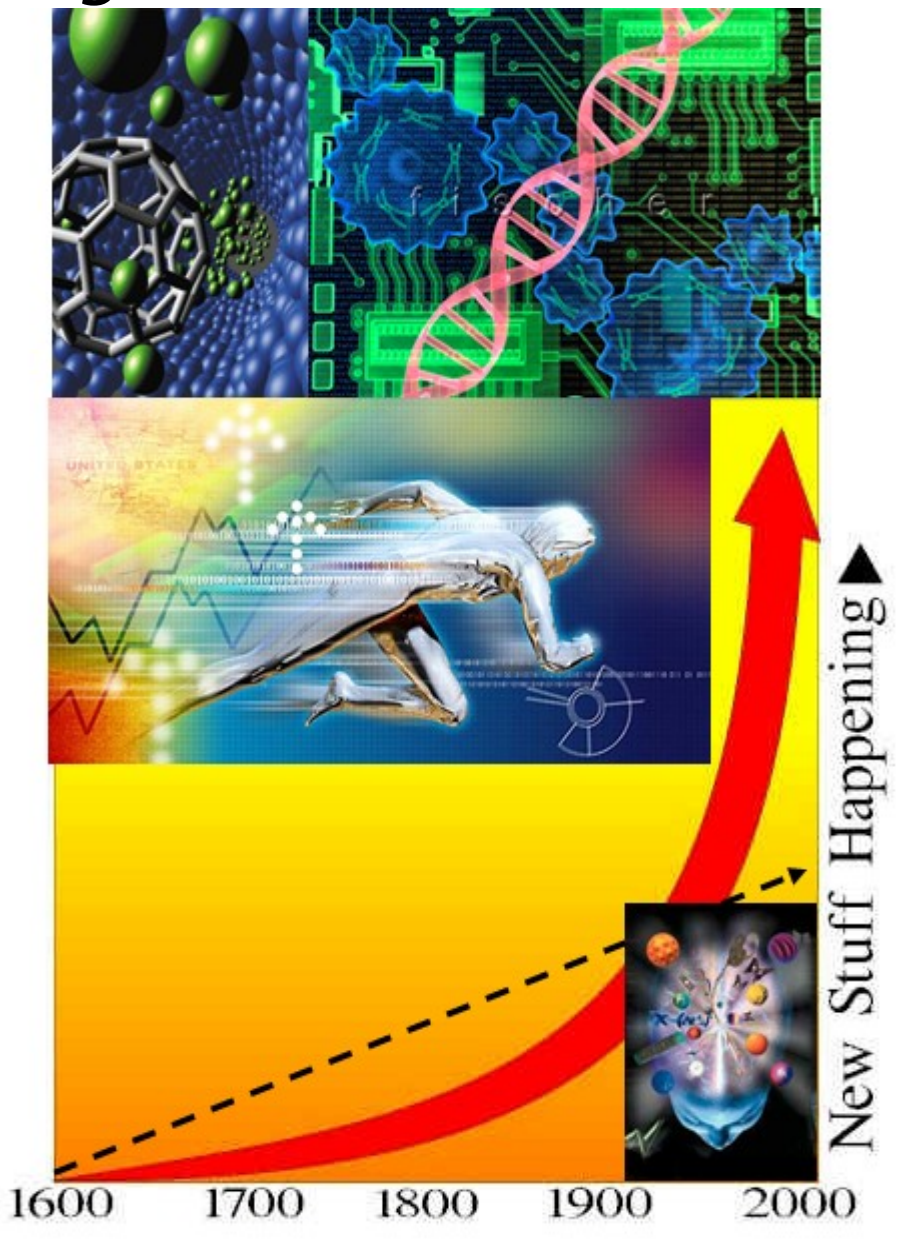
- Energy demand tracks with population and economic growth
- Liquid fossil fuels may peak before alternatives come on line
- Mismatch of supply and demand may cause shortages & economic shock, instability / state failure and great power competition may follow
- *May also encourage innovation…*





Science, Technology and Engineering

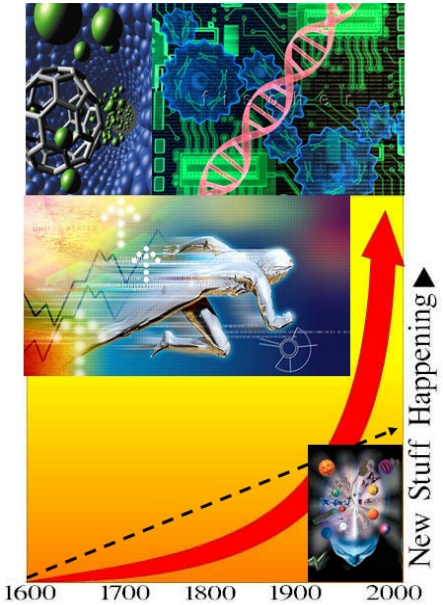
- The pace of change is dramatically accelerating
  - "We tend to overestimate shor term change, and underestimate long-term change"
- IT, Nano and Bio are mergin
- Vast new dangers (and opportunities)
  - Vast improvements in material well-being balanced against ne ways to kill and oppress



Nano/Bio/Info

- Teleoperations
- Advanced Materials
- Cellulosic Ethanol
- Artificial Organs and Tissues
- Precision Biodefense

Information Technology

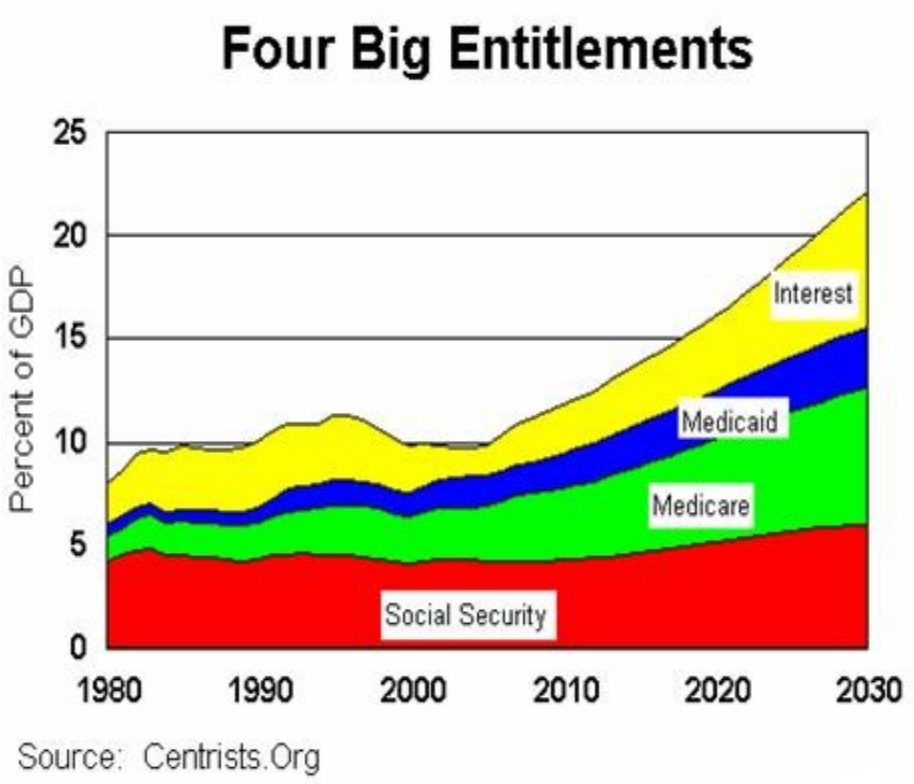


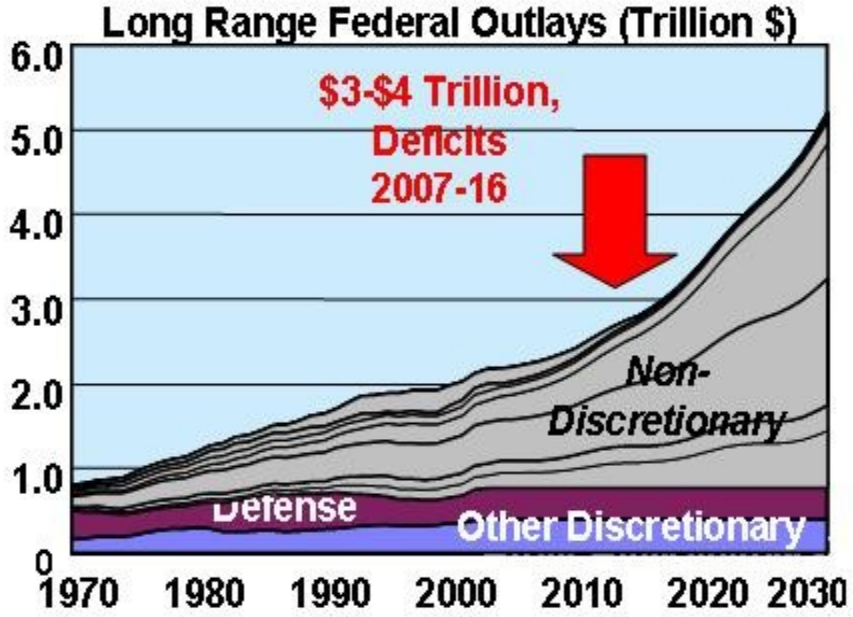
- Man/Machine Computing
- Smart Dust/Networked Bacteria
- Every Soldier a Sensor/Every Sensor to the Soldier
- “Lifelogging”
- Soldier Augmentation

Nanotechnology

Biotechnology

Constrained U.S. Military Budgets





- Increasing entitlements exert ever increasing pressure on defense spending

Examples of Trends and Variables

Trends

Human Geography

- Aging Japan and European Union populations; increasing social welfare costs; disconnection of immigrants from society.

Natural Resources

- Global energy demand increasing faster than supplies.
- Increasing water stress

Science, Technology, and Engineering

- Increasing importance of environmental-, bio-, info-, and nano-technology.
- Increasing level of political and social control over technological developments
- U.S. remains the single most powerful actor economically, technologically, militarily, but others closing the gap, or exceeding the U.S. in specific niches.

Variables

- *Ability* of EU and Japan to adapt work forces, welfare systems and integrate migrant populations

- *Extent* of political instability in energy-producing countries and supply disruptions.
- *Ability* to develop and bring new sources into production at reasonable cost.

- *Extent* to which new technologies create or resolve problems for human society.
- *Ability* of U.S. scientific and technical research and development to stay ahead of potential adversary capabilities

Examples of Trends and Variables (cont)

Trends

Production and Exchange of Information, Knowledge, and Culture

- Global firms increasingly facilitate spread of new technologies.
- Political Islam continues as a potent force.

Economics

- Globalization largely irreversible, but increasingly less Westernized.
- World economy growing and substantially larger.
- Rise of Asia and advent of possible new economic middle weights.

International Actors

- Capabilities and influence of non-state actors growing.

Variables

- *Extent* to which connectivity challenges governments.
- *Impact* of religiosity on unity of states and potential for conflict; *growth* of jihadist ideology.

- *Degree* to which globalization of trade and finance spreads wealth in lagging economies
- *Level* that Asian countries set new rules of the game; *Level* of wealth and power of China and India.
- *Extent* of gaps between “haves” and “have-nots”; capability to manage or contain financial crises.

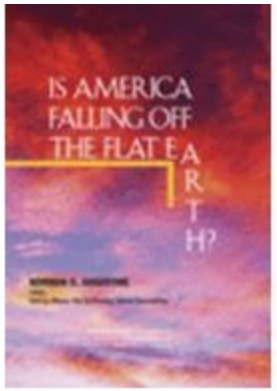
- *Willingness and ability* of states and international institutions to accommodate non-state actors.

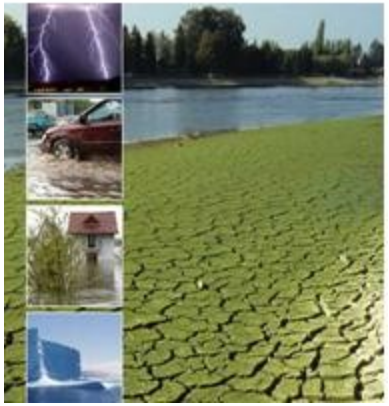
Examples of Trends and Variables (cont)

Trends	Variables
Distribution of Power •Increasing from one superpower to two, three or even four peers with 5-6 other major regional powers.	•*Ability* of evolving new powers to develop all elements on national power and will and challenge the U.S.
Governance and Legitimacy •Arc of instability spanning Caribbean, Northwest Africa, Middle East, Asia, Africa.	•Crises in the ability and legitimacy of governments; levels of regime stability
Persuasion, Coercion, and Use of Force •Improved WMD capabilities of some states •Increasing information about WMD available; increased activity by states to monitor and act against non-state actors acquiring WMD	•*Number* of nuclear powers; *ability* of terrorists to acquire biological, chemical, radiological, or nuclear weapons.

Critical Uncertainties

- American long term economic competitiveness (national debt, low savings, trade imbalance, S&T base, etc)
- China's internal leadership/economic dynamics— global spill over if socio-economic progress slows or if fragmentation occurs
- How contagious nuclear proliferation becomes
- The coming convergence of technologies, and their defense applications and social/moral implications
  - Potential for bio-rich "haves" and "have nots"
  - Will biotech generate more threats or greater defensive potential?
- Potential for sudden energy breakthrough
- Degree of sustained progress in developing countries (Brazil, Russia, India or China) and governance challenges (Saudi Arabia, Egypt, Iran, Turkey and Pakistan)
- Will schism within Islam breakout into open state conflict?
- Long term economic, health and social implications of climate change





Courtesy of USMC/SVG

Chapter 3: Future Joint Force Challenges

- ***Enduring Challenges*** are ongoing, "obvious" and include historic or "core" missions of the U.S. military.

- Example: ***Conflict with other Great Powers***
  - More fluid international environment emerges as cold war order collapses.
  - Rebalancing of global power away from the Atlantic and towards the Pacific.
  - Emergence of China and India as global players.
  - U.S. as "first among equals."
- Example: ***Collapse of Functioning States***
  - Inability of states to provide basic security and create legal and economic governance in which citizens can prosper.
  - Results in conflict within the state.
  - Spills into neighboring states and provides and environment where criminals and terrorists can operate freely against U.S. interests.

***Enduring Opportunities*:**
• Flexibility to conduct "offshore balancing" among Eurasian powers.
• Primacy of economic factors for great power status encourages cooperative approaches to the international order.
• Encourage "whole of government" approaches to security.
• Cost of peace cheap compared to the cost of war.

Chapter 3: Future Joint Force Challenges

- ***Emerging Challenges*** refer to rising challenges that flow from the failure of the current state system to retain its monopoly on force and organized violence.

- Example: ***Anti-Access Strategies and Capabilities***
  - Development of military capabilities to deny the ability of the U.S. to project power into Eurasia.
  - Anti-space capabilities, directed energy, intelligence and global information systems.
  - Integrated with political efforts to disrupt intermediate staging areas.
- Example: ***Disruption of Global Trade and Finance***
  - Attacks against key hubs in financial or trade networks.
- Example: ***Persistent Cyber-Conflict***
  - Information blockades of entire countries (Estonia).
  - Botnets with world-class processing power launch attacks or crack networks from millions of compromised computers around the world.
- Example: ***Global Anti-American Coalition***
  - World powers balance against U.S. influence.
  - Construction of alternative world order (Shanghai Cooperation Organization, coordinated disinformation campaign.

***Emerging Opportunities*:**
• Technical domains of air, sea, space and cyber (essential for anti-access) play into U.S. strengths.
• U.S. economy highly flexible and resilient. Others powers may fare worse in attacking our trade and finance.
• U.S. ownership of domain-name and root servers can disrupt adversary cyber-systems

Chapter 3: Future Joint Force Challenges

- ***National Security Shocks*** are a collection of less likely surprises that would be highly consequential for U.S. security and upset the balance of the current international system.

- Example: ***Energy Disruption***
  - Dependence on foreign energy sources a major source of vulnerability.
  - Potential emergence of trading regime of guaranteed users and suppliers lock U.S. out.
- Example: ***Nuclear Attack***
  - Overturns current world order if used anywhere.
  - Deterrence strategy against the U.S. by weaker powers.

***Taking advantage of global shocks*:**
- **Increase focus on domestic and alternative sources of energy.**
- **Decrease revenues for hostile and aggressive energy source states.**
- **Development of means to trace radiological materials.**
- **Focus on innovative deterrent strategies**
- **Develop technologies for operating in a nuclear environment.**

Chapter 4: Joint Force Implications

Terrain defines the physical and intellectual context of conflict and war.

- Battlespace approaching global dimensions, and becoming less dense.
- Lines and fronts become "volumes."
- Adversaries take every opportunity to aggravate and intensify cultural friction.
- U.S. must acquire cultural expertise and capacities to gather and use cultural knowledge.
- Operations with other elements of government and society.

A ***Base*** is a physical locality from which operations are projected or supported. Or, from a moral standpoint, it is a source of legitimacy or ideological foundation for support by a culture or society.

- Diffusion of power away from states (and the U.S.).
- U.S. must understand the base of hostile actors.
- Maintaining access to Global Commons becomes key focus for U.S. operations.
- Few U.S. sources of strength will be completely shielded from possible attack.

Chapter 4: Joint Force Implications

Force Application is the ability to impose one's will on an opponent using the assets (or weapons) at one's disposal. It is maneuver and fires (in the military context) or position and influence in non-military areas.

- U.S. dominance of maneuver warfare cause adversaries to explore other means to impose their will on the U.S.
  - Avoid open, less complex environments, seek complex urban terrain, highly trafficked sea and air lanes.
- Larger percentage of scientific research occurring outside the U.S. More around the world will have access to increasingly sophisticated technologies, leading to adversaries armed with novel capabilities.
- Increased focus on the Cognitive Domain – where perceptions, awareness, beliefs, and values reside. This may be the central campaign, with military political and other activities supporting the cognitive campaign.
- "Lawfare" - Adversaries will operate on both sides of our legal system to take advantage of its processes and protections when possible and to hobble the U.S. when not possible.

Chapter 4: Joint Force Implications

Knowledge describes the ability to gather and integrate information for purposeful action in a conflict.

- Future joint force will encounter adversaries that place the majority of effort on the cognitive domain.
- Reliance on information systems increases likelihood of adversary attacks on them.
- Information and knowledge will be widely available for minimal capital investment (e.g. satellite imagery)
- Organizations must change to take advantage of information ubiquity. (e.g. self publishing means that high-quality analysis may be found in unlikely places)

Command is the logic that translates the application of force into desired strategic outcomes. It is the unifying vision and direction for the application of force.

- Adversaries may view American confidence in the technical aspects of war as neglecting its essential political foundations.
- Commanders must be comfortable in an environment that features networks rather than hierarchies.
- Commanders must understand the relationships between military, political, economic, and other areas, especially in homeland defense missions.

Summary of the JOE

- Globalization's uneven impacts:
  - Producing dislocation, dissonance & disorder
  - Access to markets, resources highly vulnerable to disruption
- Changing security paradigm
  - Greater emphasis on prevention
  - Blurring challengers
  - Greater complexity in operating environment
- Higher rates of change & surprise
  - Greater demand for institutional and individual agility

"War and warfare do not always change in an evolutionary or linear fashion. Surprise is not merely possible, or even probable, it is certain." ~Colin Gray

Questions?

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